

**PLASMA IMMERSION ION IMPLANTATION SYSTEM INCLUDING A PLASMA
SOURCE HAVING LOW DISSOCIATION AND LOW MINIMUM PLASMA
VOLTAGE**

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ABSTRACT

A system for processing a workpiece includes a plasma immersion ion implantation reactor with an enclosure having a side wall and a ceiling and defining a chamber, and a workpiece support pedestal within the chamber having a
10 workpiece support surface facing the ceiling and defining a process region extending generally across the wafer support pedestal and confined laterally by the side wall and axially between the workpiece support pedestal and the ceiling. The enclosure has at least a first pair of openings at generally
15 opposite sides of the process region, and a first hollow conduit outside the chamber having first and second ends connected to respective ones of the first pair of openings, so as to provide a first reentrant path extending through the conduit and across the process region. The reactor
20 further includes a gas distribution apparatus on or near an interior surface of the reactor for introducing a process gas containing a first species to be ion implanted into a surface layer of the workpiece, and a first RF plasma source power applicator for generating a plasma in the chamber.
25 The system further includes a second wafer processing apparatus and a wafer transfer apparatus for transferring the workpiece between the plasma immersion implantation reactor and the second wafer processing apparatus.